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PROCEDURAL GUIDELINES FOR WATERSHED CONDITION INVENTORIES

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PROCEDURAL GUIDELINES FOR WATERSHED CONDITION INVENTORIES

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PROCEDURAL GUIDELINES FOR WATERSHED CONDITION INVENTORIES

PURPOSE

The purpose of this document is to provide a framework and some guidelines for doing Watershed Condition Inventories. The guide is not intended to be all inclusive; rather it provides a broad structure which soil and water specialists can adapt to their unique situations. Specific objectives are to:

1. Assure that adequate data is compiled to achieve the goals of identifying the soil and water resource restoration backlog and complete the execution of projects in a timely manner.

2. Provide a uniform set of criteria for identifying inventory areas to be treated as soil and water restoration.

3. Provide an approach to use for the inventory procedure.

DEFINITION

A Watershed Condition Inventory is a broad, reconnaisance inventory oriented primarily to problem identification rather than specific project design. It forms the basis for identifying potential soil and water resource restoration project areas and assigning priority for detailed planning and treatment. Soil and water resource restoration in this context refers to activities which improve soil and water resources from a degraded state to a natural level. Soil resource restoration centers on land treatment measures aimed at reducing erosion and improving soil productivity. Water resource restoration centers on work done in or adjacent to stream channels or bodies of water aimed at reducing sediment and improving water quality, quantity, or timing.

A Watershed Condition Inventory will include the determination of both soil and water resource restoration needs in one inventory. As such, soil scientists and hydrologists are to work cooperatively in a unified effort.

OBJECTIVES

The major objective for doing a Watershed Condition Inventory is to identify the total acreage in need of soil and water restoration. Backlogs are activities identified in 1975 as part of the Resource Planning Act (RPA) as needing to be done to restore renewable resources to a natural level of productivity. Soil and water resource restoration was one of the activities identifed as a backlog item by RPA. The

Watershed Condition Inventory is the mechanism by which the total soil and water restoration job, which includes the backlog, will be identified and expressed in terms of acres to be treated. Those acres requiring restoration treatment which are identified as part of the backlog will be treated first. Additional acreage identified will be treated as funding permits.

Secondary objectives of a Watershed Condition Inventory are to develop cost estimates for program planning and budgeting and assign a priority for treatment to the areas identified as needing restoration. The effort expended in developing cost estimates and assigning priorities should be consistent with the reconnaisance nature of the Watershed Condition Inventory.

WATERSHED CONDITION INVENTORY STEPS

To complete a Watershed Condition Inventory, the following steps should be followed where appropriate:

1. Establish a Forest timetable for the inventory of areas in need of soil and water resource restoration.

2. Develop criteria for identifying inventory areas requiring soil and water restoration treatment.

3. Prepare appropriate maps of watersheds to be inventoried.

4. Initially screen watersheds to identify areas needing closer evaluation.

5. Perform field evaluation of identified areas.

6. Document the Watershed Condition Inventory.

WATERSHED CONDITION INVENTORY PROCEDURE

Establish Forest Timetable (Step I)

The Forest Supervisor has the responsibility for establishing Forest priorities for soil and water restoration. Part of this task involves developing priorities for inventorying areas requiring treatment. The inventory job of identifying the Forest soil and water restoration backlog must be completed by the end of fiscal year 1981. RPA requires that all backlog restoration work must be completed no later than the year 2000. However, R-4's objective is to complete the job at a much earlier date provided funds are forthcoming. Preliminary broad guidance as to how this job will be done, who will do it, and the establishment of a timetable for accomplishment, developed in consultation between

Supervisor/staff/Rangers/specialists, is an essential first step. Inventory of areas needing soil and water restoration is a continuing task for each Forest and should be reviewed annually.

Develop Criteria (Step 2)

Criteria and guidelines for identifying areas to be treated with soil and water restoration funds are included in this guide. These criteria have Region-wide applicability. Additional criteria applicable to the unique character and restoration problems encountered on individual Forests should be developed in writing to assist with the identification of areas needing restoration treatment.

Prepare Maps (Step 3)

Maps with a scale of ½" = 1 mile are generally appropriate for initial screening to identify areas needing closer evaluation. Watershed Condition Inventories should be done using National Forest System watershed coding to the NFS watershed" level. (FSM 2575 and 2573.5 R4 Supplement 50.) This is equivalent to the old PWI watersheds. Watersheds are used to provide a systematic methodology for examining the entire land area of a Forest.

Assemblage of additional maps related to identifying treatment areas such as maps of range allotments and range condition, old timber sale areas, past restoration projects, road closures, transportation and trail systems, etc., may be useful.

Initial Screening (Step 4)

The initial screening process identifies watersheds where soil and water restoration treatment is not needed. The objective is to minimize the land area which will require detailed examination. The screening process should fully utilize any existing information including past use, local knowledge, range allotment inventories, water quality data, reports, and special studies, etc.

Following office review and preparation of maps, a conference with District resource staffs can be most useful since they are generally most knowledgeable about on the ground conditions. The objective of this session should be to extract as much useful information from the District staff as possible. Using preassembled maps, review the criteria for identifying treatment areas with the District, and watershed by watershed, question the District staff about watershed condition. Avoid identifying cause and fixing blame since this will impede the free exchange of information needed to identify problem areas.

After these sessions, screen the watersheds in the office, one at a time, to determine and mark out where available knowledge and evidence

indicate no significant change in watershed condition, watershed damage, or need for restoration. Further investigate the areas not eliminated using aerial photo interpretation and air or ground reconnaisance if necessary.

Field Evaluation (Step 5)

The area remaining for further analysis will require field evaluation to identify needed treatments and priorities. This will be done using the criteria developed at the Forest level for identifying areas needing treatment. Make field surveys, watershed by watershed, and carefully record with notes, field forms, maps, and photographs the location, extent, and type of watershed damage that is found. As potential project areas are identified, they should be delineated on a map and numbered within a watershed with a Map Reference Number. Generally, a ½" = 1 mile map will be appropriate to show areas needing soil and water restoration work.

Appropriate treatments need to be recommended during field evaluation to the degree necessary for cost of treatment estimates. Intensive treatment planning is not necessary at this stage.

Documentation (Step 6)

A certain amount of minimum documentation is required for all Watershed Condition Inventories. Accurate note taking and record keeping will be invaluable when it is time to prepare restoration plans and/or EARS. The actual preparation of restoration plans and EARS is not considered part of the Watershed Condition Inventory and will not be covered here. Appendix I contains optional form SWM-2512-1 which can be used in the field as well as to record all information needed for minimum documentation. Appendix I also contains several suggested methods for assigning priority.

The following items are required as a minimum to document a project.

1. Location Descriptors - Forest, District, Watershed.

2. Map Reference Number - Each major project component within the specific NFS watershed will have a number on the map to be used as a cross reference within the report.

3. Treatment - Briefly describe the type of treatment (e.g., sheet erosion control with seeding and fencing, gully stabilization with rock check dams, etc.).

4. Treated Acres - Show the number of acres to be treated. Treated acres are to be measured in the following way:

   a. All areas treated to improve soil productivity, reduce erosion, and improve water quality, whether structural measures are involved or not, will be the minimum area that would be fenced to protect domestic livestock from interfering with the recovery of treated areas.

b. Treatments of linear type problems, such as abandoned roads, gullies, streambanks, lake shores, etc. will be taken as the average width of the linear feature being treated or 25 feet whichever is greater, multiplied by the length and converted to whole acres.

c. Very small point treatments will be considered as 1 acre.

5. Soil/Water - Indicate whether the treated acres are basically soil resource restoration or water resource restoration. For projects containing both types of treatments, classify according to the type of treatment which is the major reason for doing the project. Projects must be categorized as either soil resource restoration or water resource restoration for accounting purposes.

6. Cost - Make an estimate of the cost of the project using the best available information. The effort expended in developing cost estimates should be consistent with the intensity of data resolution of the Watershed Condition Inventory. More detailed and specific cost estimates will be required and can only be prepared when specific project plans are prepared for implementation. Cost estimates developed at this stage need only be adequate for this level of planning and for input to the cost effectiveness analysis.

7. Priority - Using the general concept of the Cost Effectiveness Index as described in the Burned Area Emergency Rehabilitation Handbook (FSH 2509.13) assign a priority rating to each project. (See optional form SWM 2512.1, Supplements A and B.) Forest guidelines and Manual direction (FSM 2512.03 R-4 Supplement 55) can be used to supplement the cost effectiveness analysis to arrive at a final priority rating. Cost effectiveness analysis provides a process of evaluating a project in terms of economic, environmental, and social benefits expected. The effort expended on the analysis, as with developing cost estimates, should be consistent with the reconnaisance nature of the Watershed Condition Inventory. A more rigorous and detailed analysis may be desireable before project planning begins. As an initial screening process to assign priorities, a simplified cost effectiveness analysis if often adequate. Optional form SWM 2512-1 Supplement A is a useful form for summarizing the results of the cost effeciveness analysis and is recommended for projects greater than $10,000. For smaller projects, those less than $10,000, a simplified subjective evaluation may suffice for assigning priorities. Forests may, at their option, use the more complete analysis for all projects. The simplified version can be found in Appendix I as optional form SWM-2512-1 Supplement B.

After assigning a Forest priority number, the Watershed Condition Inventory is completed and should be filed by the specific NFS watershed number. This file will contain the inventory and all subsequent plans and material relevant to restoration work on that watershed. The file will remain "active" until all project objectives, including maintenance, are fully accomplished. An inventory of all completed Watershed Condition Inventories by priority will be mapped and revised annually as necessary.

GUIDELINES AND CRITERIA FOR IDENTIFYING AREAS TO BE TREATED

The primary purpose of a Watershed Condition Inventory is to identify areas that are qualified for restoration using soil and water resource restoration funds. Two concepts should be kept in mind when identifying soil and water restoration projects: (1) Sites needing restoration within areas used for intensive ongoing resource management activity should be rehabilitated at the expense of the activity causing the impact. Soil and water resource restoration funds are not intended to restore problem areas created by ongoing activities. These must be corrected by the functional area responsible for causing the problem; (2) Intent is a key consideration in determining the appropriate funding for soil and water restoration projects. Soil and water restoration funds are appropriately used when the intent is to protect watershed values.

Watershed condition and treatment information is needed on all damaged areas within a watershed, even though some areas cannot be treated with funds appropriated for soil and water restoration unless they are to be closed. Examples of these latter areas are:

- System roads needed for future access. (Stabilization is to be accomplished by FR&T funds.)
- System trails needed for future access. (Stabilization is to be accomplished by FR&T or Recreation funds.)
- Active timber sales. (Stabilization is to be accomplished by Cooperative Erosion Control funds for disturbances under the current sale or K-V funds for pre-existing disturbances.)
- Active livestock driveways on which future use is expected. (Stabilization is to be accomplished by FR&T funds or by the permittee.)
- Areas open to off-road vehicles and planned to remain open. (Stabilization is to be accomplished by Recreation funds.)

Information about these areas, while not an essential part of the Watershed Condition Inventory done for soil and water restoration purposes, is still valuable to District Rangers and others in making decisions about management. Deterioration of these areas is also of concern to soil and water specialists, since they affect the soil and water resource. The Watershed Condition Inventory provides an opportunity to collect information about some of these areas and bring them to the attention of those responsible for acting on them.

The guidelines and criteria that follow are aimed at providing a degree of uniformity in the areas identified for treatment throughout the Region. The criteria are not all inclusive and may need to be modified for application to all Forests in the Region. They are divided into two parts: the first deals with activities identified as soil resource restoration; the second, deals with activities identified as water resource restoration.

SOIL RESOURCE RESTORATION GUIDELINES AND CRITERIA

I. ROADS AND TRAILS

General Guidelines

1. From a soil and water standpoint, the objective of road and trail closure should be to: (1) restore land to production; (2) improve water quality; or (3) both of the above. It is not soil and water's objective to maintain the useability of the road or trail.

2. All roads and trails on which future use is not foreseen should be restored to a near natural condition using soil resource restoration funds (092), K-V funds, or range funds where appropriate.

3. Roads and trails to be treated as part of soil resource restoration must not be part of the permanent road or trail system. System roads and trails are to be treated with FR&T funds.

4. All abandoned roads and trails, including those not currently a problem but with the potential for becoming a problem if use is allowed to continue, should be treated with soil resource restoration funds.

5. Old abandoned roads on ongoing (or planned) timber sales that will not be used by the operator should be treated with K-V funds, if available, and secondarily with soil resource restoration funds. (See FSM 2477 for details of using K-V funding for soil and water resource restoration for road obliteration as well as other types of restoration activities.)

6. Temporary and specified roads within ongoing timber sales should not be treated with restoration funds.

7. Stock driveways are part of the road and trail system. Abandoned stock driveways are to be treated essentially the same as abandoned trails.

Criteria to Evaluate Need for Restoration Treatment

1. Roads and trails where severe to active erosion is evidenced on the road surface or adjacent to the road or trail as a result of water draining from the road or trail.

2. Roads or trails where active rill and/or gully erosion is present.

3. Roads showing no evidence of significant natural revegetation or soil stabilization.

4. Roads or trails on soils having high to moderate erodibility.

5. Roads having unstable or eroding fill slopes.

6. Roads where cut banks show evidence of mass soil movement or evidence of erosion.

7. Roads with inside ditches showing evidence of gullying.

8. Roads or trails with poor surface drainage.

9. Roads or trails having improperly designed stream crossings.

10. Roads or trails located in floodplains or wetlands.

11. Roads or trails that are actively polluting streams with sediment.

Additional Guidance and Examples

1. Any off-site damage that has resulted from road or trail drainage flow, etc., should be repaired at the same time the road or trail is obliterated. Treat the entire problem at one time as one project and not just part of it.

2. Generally the only time when trails would be treated with soil resource restoration funds are cases where a trail has been abandoned and relocated to a new location and the old trail is causing problems. Existing system trails that are deteriorating or severely eroding should be repaired with FR&T or recreation funds. The same is true for stock driveways except that FR&T funds alone can be used for maintenance.

3. Roads and trails to be closed should be treated so as to prevent future use.

4. Treatment of roads and trails must be coordinated with other Forest resource uses and planning such as road closure plans, transportation planning, ORV plans, etc. For example, there is no sense treating an ORV damaged area if ORV closure enforcement will not be carried out and made a part of the plan.

5. Full advantage should be taken of locating planned timber sales to obtain treatment and closure of unneeded existing roads. Such roads can be utilized through proper planning as temporary roads or skidtrails on such sales and then closed in accordance with standard timber sale contract provisions.

6. System roads which have been abandoned due to realignment and which have not been obliterated can be treated with soil resource restoration funds.

7. In the case of culvert "blowouts" on system roads, culvert and road prism replacement are done with FR&T funds while any downstream or downslope damage may be repaired with soil and water resource restoration funds.

8. Any downslope or downstream damage resulting from improper road drainage of system roads can be treated with soil and water restoration funds. Concurrently, the source area should be treated with FR&T funds to prevent reoccurrence.

9. In situations where stream channel changes are encroaching on the road prism and causing slumping, treatment should first be affected with FR&T funds if the intent is to restore the road prism to a serviceable level. Soil and water restoration funds may be used if the primary intent of treatment is to protect watershed values. However, first attempts should be directed toward obtaining FR&T funding.

10. In situations where stream channels have been realigned to allow easier crossing of a stream by a road, channel and streambank scour often occur downstream as a direct result of channel modification. Treatment of the streambank, even though a direct result of road construction, can be done with water resource restoration funds. However, FR&T funding may be used if damage can be directly linked to the road and funding is available. The possiblity of using FR&T funding should at a minimum be explored, however, emphasis should be placed on getting the job done and protecting the resource regardless of funding if conflicts develop. In many cases, water resource restoration funds will be the only means for attaining this objective. The best situation is to recognize the potential problem during the planning process and build treatment into the original design and fund with FR&T funds.

II. SHEET EROSION CONTROL

General Guidelines

1. Soil resource restoration funds are properly used for sheet erosion control in areas where accelerated sheet or rill erosion has progressed to the point that satisfactory restoration cannot be accomplished solely through changes in land use patterns or closures.

2. Changes in land use patterns such as closure to grazing or modification of existing grazing systems are often necessary for a specified period of time to achieve effective erosion control. (See FSM 2205.13.) Before this kind of work is done with soil and water funds, there must be assurance of protection of the soil and water investment. This may be done through management or may require exclusion of existing uses.

3. Intent is a key consideration in determining the appropriate funding for sheet erosion control projects. The intent or the purpose for which the treatment is carried out forms the basis for funding. As an example, consider an area that has been overgrazed and is in need of treatment. A series of treatments consisting of a variety of nonstructural range improvements and watershed nonstructural measures are proposed. With a project of this type, both range and watershed values obviously benefit and identical work could be done under either functional unit financing. If the intent is to improve the amount and kind of forage primarily for livestock grazing, range funds are appropriately used. If the intent is

to prevent erosion, reduce sediment delivery, or protect watershed values, soil and water restoration funds are appropriate. In many situations, one or more resources will benefit and multifunctional financing is generally most appropriate.

Criteria to Evaluate Need for Restoration Treatment

1. Areas where the soil cover (sum of rocks plus live plant crown plus organic litter) is less than 30%.

2. Areas where range condition ratings are poor to very poor and trend in range condition is steady or decreasing. (See FSM 2212.5 for definition of range condition).

3. Areas where sheet and rill erosion has become so severe as to result in the formation of gully networks.

4. Areas where sheet and rill erosion has reduced site productivity below its natural level.

5. Areas denuded of natural vegetation.

6. Areas where plant pedestals are evident.

7. Areas where soil compaction concentrates runoff to form rills and gullies.

8. Areas with high soil erodibility, especially on shallow soils.

9. Areas from which deterioration of the site is producing increased peak flows and flooding.

10. Areas from which unacceptable levels of on-site erosion are reaching live streams and adversely impacting water quality and beneficial water uses.

III. MINE RESTORATION

General Guidelines

1. Soil resource restoration funds are properly used to restore abandoned mines or prospecting areas to proper hydrologic functioning, stop accelerate erosion, or improve esthetics. ("Abandoned" means there is no present-day known claimant.)

2. Restoration of lands disturbed by present or past mining activity on current claims (where ownership can be established) is the responsibility of the claimant.

3. Restoration of lands disturbed by mining currently in progress is the responsibility of the operator.

4. Before initiating any detailed planning, mine restoration work must be coordinated with the Minerals Area Management staff to deterime the legal right of the Forest Service to do restoration work. Every effort must be made to identify any claimants prior to proceeding with any work.

Criteria to Evaluate Need for Treatment

Criteria are essentially the same as those for Sheet Erosion Control but also includes evaluation of possible pollutants other than sediment (e.g. acid mine drainage, chemical pollutants, etc.).

IV. STABILIZATION OF DUNES, BLOWOUTS, AND BORROW PITS

General Guidelines

1. Soil resource restoration funds are properly used for stabilizing dunes, blowouts, and borrow pits where accelerated erosion or wind erosion has progressed to the point that some type of treatment is necessary to restore the area to its natural productivity.

2. Areas needing stabilization that are directly attributable to or for the protection of a specific function should be restored by that function.

Criteria to Evaluate Need for Treatment

1. Criteria for treating blowouts and borrow pits are essentially the same as those given for Sheet Erosion Control.

2. Criteria for dune stabilization are:

a. Dunes which are actively moving and expanding.

b. Dunes which are encroaching on investments such as roads, campgrounds, etc.

c. Dunes which produce dust or sand storms, which are a safety hazard.

d. Dunes which encroach on streams and therefore impact water quality and downstream uses.

V. MASS MOVEMENT

General Guidelines

1. Soil and water resource restoration funds are properly used to stabilize the various types of mass movement where mass movement is small enough to be effectively treated and future movement and damage can be prevented by treatment. Stabilization of mass movement areas should only be attempted under rare circumstances where high values are involved.

2. Stabilization of naturally occuring and/or large mass movements should generally not be attempted. Treatment of mass movement on disturbed areas, such as within old timber sale areas, should take priority over treatment of mass movement occurring on undisturbed sites.

3. Mass movement resulting from management related causes, if treated, should be paid for by the responsible function. Due to the difficulty of successfully treating mass movements, emphasis must be placed on prevention of mass movement during the planning process.

4. Mass movement stabilization in the road right of way should be done with FR&T funds.

Criteria to Evaluate Need for Treatment

1. Mass movements that are small enough in size to be successfully stabilized.

2. Mass movement that threatens prior investments such as campgrounds, facilities, etc.

3. Mass movement where the cause of movement can be removed (e.g., diverting water above a slump to remove the lubricating media).

4. Mass movement adjacent to streams that would reduce water quality below minimum standards, impact fisheries or other instream values, or reduce downstream values or uses of water.

WATER RESOURCE RESTORATION GUIDELINES AND CRITERIA

I. GULLIES

General Guidelines

1. Water resource restoration funds are properly used to treat gully networks where accelerated erosion is actively expanding the gully system and/or causing sedimentation which reduces water quality below minimum standards, seriously impacting downstream use of water; adversely affecting instream water resources; or causing unacceptable on-site losses of soil productivity.

2. Measures should be taken outside of the channel whenever possible to increase infiltration and decrease overland flow to benefit the gully healing process and accelerate the natural rate of healing. Combining land treatment measures with structural gully control measures generally leads to faster gully improvement. Changes in land management or uses, such as reduced grazing or improved road drainage are often necessary for successful gully stabilization projects.

3. Immediate and long-term objectives of gully treatment must be decided before measures are selected since objectives will determine measures. Examples of short-term objectives include sediment entrapment, esthetic considerations, raising the water table, decreasing peak flows, re-establishing vegetation, and stopping gully widening, deepening, or advancement. The long-term objective should always be to stabilize the gully with vegetation. Short-term objectives will generally alter gully conditions to assist in attaining this goal. Structural and vegetative treatments should supplement each other.

4. Gully control work should emphasize gully stabilization rather than sediment entrapment. Attempt to treat the source of the problem instead of simply controlling one of the symptoms. Sediment basins to catch sediment and debris are only appropriately used as an interim measure where management and land treatment measures will not eliminate the problem within a reasonable period of time. Sediment basins are most appropriate as emergency measures following catastrophic events such as large fires where drastic measures are needed to protect downstream watershed values for a short period of time.

Criteria to Evaluate Need for Restoration Treatment

1. Gully systems that are in a juvenile stage of development (i.e., frequent and pronounced bed scarps with beginning meandering which produces new, steep, and undercut concave gully walls as opposed to gullies with bedrock or vegetated bottoms and sloped, vegetated banks).

2. Gullies whose future rate of erosion is expected to be high.

3. Gullies with steep, almost vertical sides.

4. Gullies where there is no evidence of vegetation establishment along the gully bottom or the side slope.

5. Gully systems containing active headcuts.

6. Gully networks located in highly productive land, e.g., gullies in productive wet meadows should receive priority over gullies on less productive dry sites, other factors being equal.

7. Gullies that threaten improvements, facilities, or other investments previously made on the land.

8. Gullies producing sediment which reduces water quality below minimum standards.

9. Gullies whose sediment production decreases the useful life of downstream dams and reservoirs or the downsteam use of water for irrigation.

10. Gullies whose sediment production adversely affects instream water resource use such as fisheries or recreation.

11. Gullies located within municipal watershed boundaries.

II. STREAM CHANNEL CLEARING

General Guidelines

1. Water resource restoration funds are properly used for channel clearing where accumulated organic and inorganic debris in or immediately adjacent to the stream channel may direct floods into erodible streambanks, form debris dams, or excessively constrict culvert or bridge flow.

2. Channel clearing restoration work must recognize that there is a natural level of debris, such as logs and rocks, in all stream channels and that channel clearing should not be carried out to such a degree that the stream is put into a state of disequilibrium. Rocks, logs, or debris which are well lodged, have been in the stream many years, or are protecting banks should not be removed. Similarly, rocks and logs that are providing velocity retards or steps and drops which do not divert flow against unstable banks should not be removed. In addition, a certain percentage of debris and logs provides protection and shelter for instream aquatic life. Consultation with fishery biologists may be necessary to determine the amount of removal.

3. Debris clearing projects must take a consideration of existing structures in the stream system. If culverts and bridges are large enough to safely pass floatable debris of the size found in the channel, clearing may not be necessary.

Criteria to Evaluate Need for Restoration Treatment

1. Channels with high debris dam potentials, (i.e., moderate to heavy accumulations of floatable debris capable of forming debris dams is present due to fires, insect attacks, disease mortality, windthrow, or logging slash).

2. Channels where debris is diverting water into banks causing mass wasting, bank cutting, or increased sediment production.

3. Channels where debris is forcing flow outside of the normal channel.

4. Channels where debris has formed large dams.

5. Channels where debris is preventing the safe passage of water through structures such as bridges and culverts.

6. Channels where debris is impeding the normal flow of water at bridges and culverts in such a manner that the structures or adjacent roads are threatened.

7. Channels with a past history of bridge or culvert failure due to debris restricting flows.

8. Channels with high mass wasting hazard, (i.e., large and frequent mass wasting evident along streambanks).

9. Channels with enlarging gravel bars and fresh deposits of sediments behind organic debris.

III. STREAMBANK STABILIZATION

General Guidelines

1. Water resource restoration funds are properly used for streambank stabilization where active streambank erosion is reducing water quality below minimum standards, impacting downstream use of water, adversely affecting instream water resources, or causing unacceptable on-site losses of soil and soil productivity.

2. Streambank stabilization work must recognize that some bank cutting occurs naturally in all streams and that all areas with bank cutting do not necessarily require treatment. Streambank stabilization of man/caused bank cutting should, in general, be given priority over the treatment of natural bank cutting.

3. The intent or the purpose for which streambank stabilization is carried out will often form the basis for funding when other functions are involved. For example, streambank cutting threatening a campground may be funded by recreation if the intent is to protect the campground, or funded by soil and water if the intent is protection of watershed values. In many cases, multifunctional funding is most appropriate.

4. Streambank stabilization includes both structural measures such as gabions, jetties, groins, tetrahedrons, etc. and non-structural measures such as willow planting and modifications in streamside management or land uses. Often structural and non-structural measures are used together.

Criteria to Evaluate Need for Treatment

1. Streams with frequent bank cutting, 2 feet or higher, containing undercutting, and sod or root overhangs with evident sloughing.

2. Streams with less than 50 percent vegetative bank protection.

3. Streams with less than 50 percent bank rock content.

4. Streams with high debris dam potentials which divert flow into banks.

5. Streams where undercutting threatens improvements, facilities, or investments previously made on the land.

6. Streams where bank cutting produces sediment which reduces water quality below minimum standards.

7. Streams where sediment production from bank cutting decreases the useful life of downstream dams and reservoirs or the downstream use of water for irrigation.

8. Streams where bank cutting adversely affects instream water resources such as fisheries or recreation.

9. Streams where bank cutting is highly visible to large numbers of Forest visitors.

IV. LAKESHORE AND RESERVOIR-SHORE STABILIZATION

General Guidelines

1. Water resource restoration funds are properly used for lakeshore and reservoir-shore stabilization where excessive losses of soil are occurring which impacts water quality, esthetics, fisheries, recreation, or is a safety hazard.

2. Stabilization should only be done where management which produced the need for stabilization treatment will be changed to avoid recurrence of the problem. For example, if excessive fluctuation of reservoir levels results in oversteepened banks, treatment should not be affected with water resource restoration funds until reservoir operations can be modified.

3. Shore stabilization includes both structural measures such as gabions, retaining walls, etc. and non-structural measures such as willow planting and modification of lake or reservoir-shore management or land uses. Often structural and non-structural measures are used together.

Criteria to Evaluate Need for Restoration Treatment

1. Shores where steep vertical cutbanks are evident.

2. Shores where large losses of soil are occurring due to slumping and wave action.

3. Shores where bank cutting is threatening some type of prior investment, (e.g., campground, roads, etc.).

V. POLLUTION ABATEMENT

General Guidelines

1. Water resource restoration funds are properly used for pollution abatement where streams, lakes, or reservoirs suffering from biological imbalance or chemical contamination are restored to natural levels. Funds should only be used when the problem cannot be corrected by land treatment measures or changes in management within a reasonable span of time.

2. Chemical or biological imbalance or contamination resulting from a permittee or other special uses on the Forest must be corrected by the responsible party.

Criteria to Evaluate Need for Treatment

1. Bodies of water where the results of water quality monitoring consistently indicate the water to be below minimum standards.

2. Bodies of water where fish kills have occurred.

3. Bodies of water which have produced livestock or wildlife deaths or illness as a result of drinking the water.

4. Bodies of water with excessive eutrophication (i.e., presence of large numbers of algae, greenish water, etc.).

5. Bodies of water with excessive plant growth.

APPENDIX I - OPTIONAL FORMS AND EXAMPLE

Appendix I contains optional form SWM-2512-1. It can be used as a field form to summarize basic inventory data on a project basis. Supplements A and B can be used to assist with setting priorities for restoration treatment. A completed example in which all the forms have been filled out is also provided. Normally, only one of the priority setting forms would be filled out for a given project.

WATERSHED CONDITION INVENTORY FOR SOIL AND WATER IMPROVEMENT

PROJECT NAME: _____ Prepared by: _____
PRIORITY: District _____ Forest _____ Date: _____

I. PROJECT LOCATION:
- A. FOREST _____
- B. DISTRICT _____
- C. WATERSHED: Name _____ Watershed Code No. _____
  Subwatershed Name _____
- D. MAP REFERENCE NUMBER _____

II. TOPOGRAPHY: SLOPE _____ ASPECT _____ Accessible by Machinery YES ☐ NO ☐

III. LSI CLASSIFICATION _____
REMARKS _____

IV. NATURE OF PROBLEM:

A.

EROSION				STABILITY		OTHER	
SHEET	☐	STREAMBANK	☐	SLUMP	☐	CHANNEL DEBRIS	☐
RILL	☐	CHANNEL	☐	LANDFLOW	☐	COMPACTION	☐
GULLY	☐	ABANDONED ROAD	☐	DEBRIS SLIDE	☐	_____	☐

B. GENERAL CAUSE: NATURAL ☐ MANAGEMENT RELATED ☐

SPECIFIC CAUSE: _____

C. CONDITION TREND: ↑ → ↓ (Circle one)

D. AREA/TREATMENT UNITS:

	Total Acres	BREAKDOWN Acres	Miles	Cu.Yds.	Other
SOIL Project					
WATER Project					

E. DESCRIBE PROBLEM: _____

F. IMPACT ON RESOURCES AND USES:

	DEGREE OF IMPACT PROJECT L	M	H	OFFSITE L	M	H
1. Anadromous Fish						
2. Resident Fish						
3. Wildlife						
4. Range						
5. Timber						
6. Water						
7. Recreation						
8. Soil Productivity						

V. RECOMMENDED ACTION: _____

VI. COST DATA: A. ESTIMATED TOTAL COST: $ _____
B. COST DISTRIBUTION: SOIL ____ % WATER ____ % OTHER ____ %

APPENDIX: Photos, Maps, Other Supporting Data

PRIORITY SETTING FORM: COST EFFECTIVENESS SUMMARY

Project Name: _____

The purpose of this form is to provide a place to summarize the results of the cost effectiveness analysis. Refer to Chapter 30, Burned Area Emergency Rehabilitation Handbook for detailed procedures for calculating the economic, environmental, and social indices summarized on this form.

1. ECONOMIC: BENEFIT-COST RATIO ☐

BENEFIT-COST RATING (F, M, U) ☐

Favorable (F) = 1.0 or higher
Marginal (M) = 0.7 or higher but less than 1.0
Unfavorable (U) = less than 0.7

If a benefit-cost ratio cannot be computed make a subjective evaluation of economic benefits using the following definitions:

Favorable (F) = high economic benefit
Marginal (M) = moderate economic benefit
Unfavorable (U) = no or little economic benefit

SUBJECTIVE ECONOMIC INDEX ☐

2. ENVIRONMENTAL: NET ENVIRONMENTAL QUALITY BENEFIT INDEX ☐

NET ENVIRONMENTAL QUALITY BENEFIT RATING (S, NS) ☐

0.7 or higher = Significant Benefit (S)
Less than 0.7 = No Significant Benefit (NS)

3. SOCIAL: NET SOCIAL WELL-BEING BENEFIT INDEX ☐

NET SOCIAL WELL-BEING BENEFIT RATING (S, NS) ☐

0.7 or higher = Significant (S)
Less than 0.7 = Not Significant (NS)

COST EFFECTIVENESS INDEX

Consideration	I	II	II	III	III	IV
ECONOMIC	F	M	F	F	M	All other combinations
ENVIRONMENTAL	S	S	S	NS	S	are
SOCIAL	S	S	NS	S	NS	no go
	"Go"	"Go"	"Go"	"Go"	"Go"	"No Go"

COST EFFECTIVENESS INDEX ☐

4. Priority Setting: Review the priorities listed in FSM 2512.03 R-4 Supplement 99 and any Forest priorities. With these in mind, list priorities:

PRIORITY SETTING FORM: SUBJECTIVE EVALUATION

Project Name: _____

The purpose of this form is to provide a simple process to make subjective priorities for soil and water restoration projects. Included in each category are examples of considerations for high ratings. Consider the size and location of the project, its physical resources and potential damage that could occur, complete the following ratings:

1. ECONOMIC RATING: HIGH ☐ MED ☐ LOW ☐ *Potential severe damage to municipal watersheds, anadromous fish spawning beds, storage reservoirs, etc.

Consider the damage that is occurring both on-site and downstream, and the value of the economic effect, list reasons for your rating:

_____

_____

_____

_____

2. ENVIRONMENTAL: HIGH ☐ MED ☐ LOW ☐ *Major reductions in soil productivity, water quality, esthetics, in visually sensitive areas, etc.

Rate the relative value of the project in terms of its effect on the various resources. List reasons for rating:

_____

_____

_____

_____

3. SOCIAL CONCERNS: HIGH ☐ MED ☐ LOW ☐ *Life, safety, health, recreation opportunities foregone, loss of economic stability, threat to special sites, etc.

Consider the effects of the project on such things as life, health, safety, recreational opportunities and preservation of cultural, historic, and special sites. List reasons for your rating:

_____

_____

_____

_____

4. Priority Setting: Review the priorities listed in FSM 2512.03 R-4 Supplement No. 55 and any Forest priorities. With these in mind, coupled with items 1-3 above, list your priorities:

*HIGH Rating = significant existing or potential effects
MED Rating = moderate existing or potential effects
LOW Rating = little or no expected effects

EXAMPLE

WATERSHED CONDITION INVENTORY FOR SOIL AND WATER IMPROVEMENT

PROJECT NAME: Doe Springs — Prepared by: John Doe
PRIORITY: District 1 Forest 5 — Date: June 1, 1979

I. PROJECT LOCATION:
- A. FOREST National
- B. DISTRICT Woodsy
- C. WATERSHED: Name Flowing River — Watershed Code No. 16020204-056
  Subwatershed Name Doe Creek
- D. MAP REFERENCE NUMBER 56-1

II. TOPOGRAPHY: SLOPE 60 % ASPECT North — Accessible by Machinery: YES [ ] NO [X]

III. LSI CLASSIFICATION A-1 Alpine-like
REMARKS Soils derived from pumice and ash; loosely structured, highly erosive when subject to concentrated water

IV. NATURE OF PROBLEM:

A.

EROSION				STABILITY		OTHER	
SHEET	☐	STREAMBANK	☐	SLUMP	☐	CHANNEL DEBRIS	☐
RILL	☐	CHANNEL	☐	LANDFLOW	☐	COMPACTION	☐
GULLY	☒	ABANDONED ROAD	☐	DEBRIS SLIDE	☐	_____	☐

B. GENERAL CAUSE: NATURAL ☒ MANAGEMENT RELATED ☐

SPECIFIC CAUSE: High intensity rainstorm (4"/hr.) caused numerous gullies

C. CONDITION TREND: ↑ → (↓) (Circle one)

D. AREA/TREATMENT UNITS:

	Total	BREAKDOWN			
	Acres	Acres	Miles	Cu. Yds.	Other
SOIL Project	300	300			Structures
WATER Project	33				33

E. DESCRIBE PROBLEM: Numerous gullies 3' to 8' deep in pumice soils on steep slopes are in need of stabilization before increasing in size and number

F. IMPACT ON RESOURCES AND USES:

	DEGREE OF IMPACT					
	PROJECT			OFFSITE		
	L	M	H	L	M	H
1. Anadromous Fish	Xx			Xx		
2. Resident Fish			XX		XX	
3. Wildlife	XX			XX		
4. Range			XX	XX		
5. Timber		XX		XX		
6. Water			XX		XX	
7. Recreation	XX			XX		
8. Soil Productivity			XX	XX		

V. RECOMMENDED ACTION: Install small rock check dams; reshape vertical banks and grass seed channel area with willow planting in selected areas; close area to grazing for 2 years by fencing to assist rehabilitation.

VI. COST DATA: A. ESTIMATED TOTAL COST: $ 10,000
B. COST DISTRIBUTION: SOIL ____ % WATER 100 % OTHER ____ %

EXAMPLE

PRIORITY SETTING FORM: COST EFFECTIVENESS SUMMARY

Project Name: Doe Springs

The purpose of this form is to provide a place to summarize the results of the cost effectiveness analysis. Refer to Chapter 30, Burned Area Emergency Rehabilitation Handbook for detailed procedures for calculating the economic, environmental, and social indices summarized on this form.

1. ECONOMIC:

BENEFIT-COST RATIO: 0.9

BENEFIT-COST RATING (F, M, U): M

Favorable (F) = 1.0 or higher
Marginal (M) = 0.7 or higher but less than 1.0
Unfavorable (U) = less than 0.7

If a benefit-cost ratio cannot be computed make a subjective evaluation of economic benefits using the following definitions:
Favorable (F) = high economic benefit
Marginal (M) = moderate economic benefit
Unfavorable (U) = no or little economic benefit

SUBJECTIVE ECONOMIC INDEX: -

2. ENVIRONMENTAL: NET ENVIRONMENTAL QUALITY BENEFIT INDEX: 1.2

NET ENVIRONMENTAL QUALITY BENEFIT RATING (S, NS): S

0.7 or higher = Significant Benefit (S)
Less than 0.7 = No Significant Benefit (NS)

3. SOCIAL: NET SOCIAL WELL-BEING BENEFIT INDEX: 0.7

NET SOCIAL WELL-BEING BENEFIT RATING (S, NS): S

0.7 or higher = Significant (S)
Less than 0.7 = Not Significant (NS)

COST EFFECTIVENESS INDEX

Consideration	I	II	II	III	III	IV
ECONOMIC	F	M	F	F	M	All other combinations
ENVIRONMENTAL	S	S	S	NS	S	are
SOCIAL	S	S	NS	S	NS	no go
	"Go"	"Go"	"Go"	"Go"	"Go"	"No Go"

COST EFFECTIVENESS INDEX: II

4. Priority Setting: Review the priorities listed in FSM 2512.03 R-- Supplement 55 and any Forest priorities. With these in mind, list priorit

Priority #1 on Woodsey District
Priority #5 on Forest

EXAMPLE

PRIORITY SETTING FORM: SUBJECTIVE EVALUATION

Project Name: Doe Springs

The purpose of this form is to provide a simple process to make subjective priorities for soil and water restoration projects. Included in each category are examples of considerations for high ratings. Consider the size and location of the project, its physical resources and potential damage that could occur, complete the following ratings:

1. ECONOMIC RATING:

HIGH	[ ]	*Potential severe damage to municipal
MED	[ ]	watersheds, anadromous fish spawning
LOW	[XX]	beds, storage reservoirs, etc.

Consider the damage that is occurring both on-site and downstream, and the value of the economic effect, list reasons for your rating:

Little economic damage except some minor loss of recreation use days on Flowing River due to turbidity which might affect catchability of fish.

2. ENVIRONMENTAL:

HIGH	[XX]	*Major reductions in soil productivity,
MED	[ ]	water quality, esthetics in visually
LOW	[ ]	sensitive areas, etc.

Rate the relative value of the project in terms of its effect on the various resources. List reasons for rating:

Continued erosion will damage fish spawning areas, reduce range forage, and reduce on-site productivity for growing timber and other vegetation. Eroding gullies are contributing high turbidity to Flowing River during rainstorms.

3. SOCIAL CONCERNS:

HIGH	[ ]	*Life, safety, health, recreation
MED	[XX]	opportunities foregone, loss of economic
LOW	[ ]	stability, threat to special sites, etc.

Consider the effects of the project on such things as life, health, safety, recreational opportunities and preservation of cultural, historic, and special sites. List reasons for your rating:

This area is on the edge of a historic Indian camping area and there is some outside possibility sediment from the area might inundate sections of this historic site.

4. Priority Setting: Review the priorities listed in FSM 2512.03 R-4 Supplement No. 55 and any Forest priorities. With these in mind, coupled with items 1-3 above, list your priorities:

HIGH Rating* - Priority #1 on Woodsy District; Priority #5 on Forest

(** Gullies in erosive area and expanding rapidly)

*HIGH Rating = significant existing or potential effects
MED Rating = moderate existing or potential effects
LOW Rating = little or no expected effects